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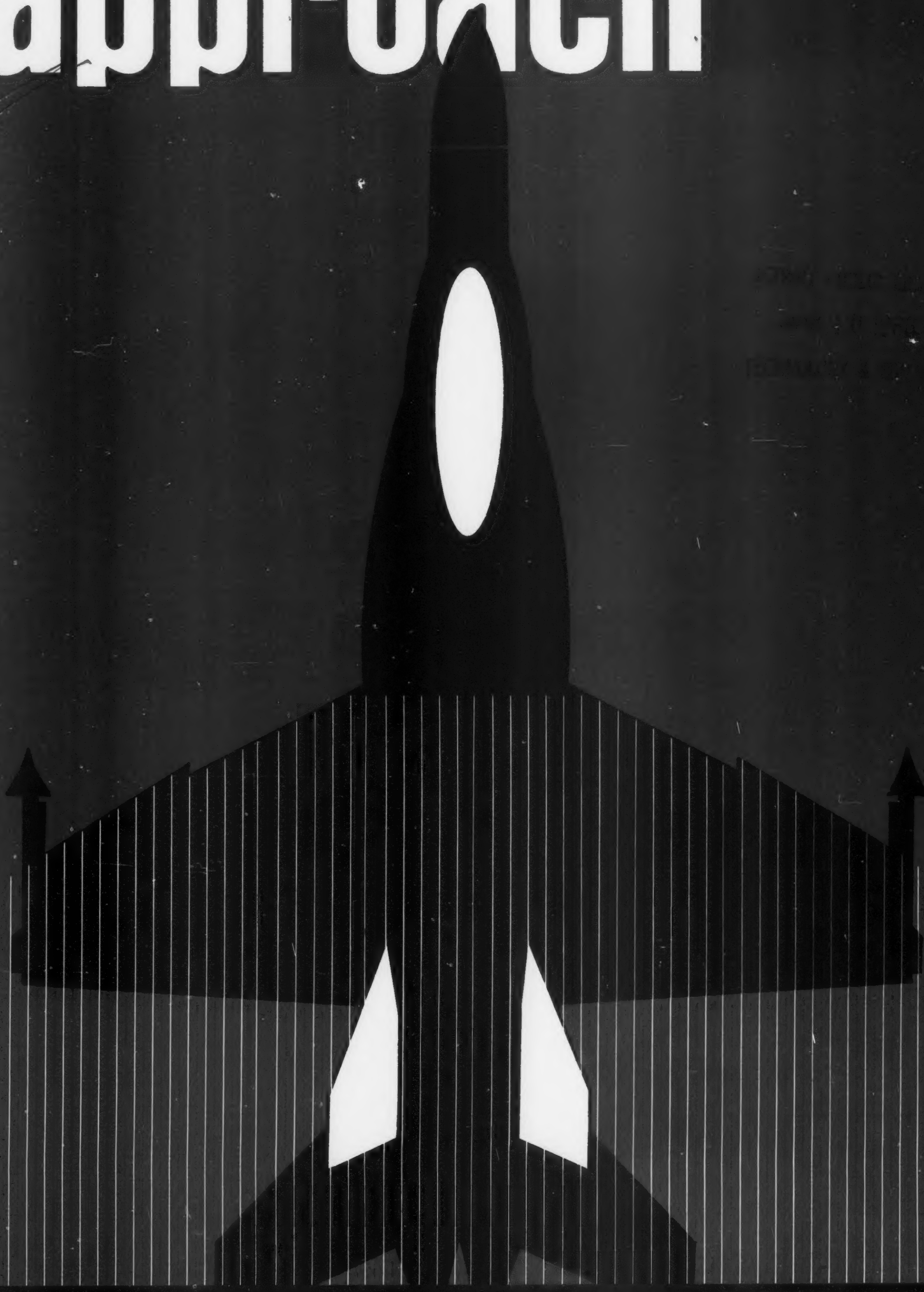
approach

V.31 #7



A New Year — Yet, Flight Safety Isn't New

Here we are in the new year already. As we take off into 1986 — the 75th anniversary of naval aviation (May 8 to be exact) — we're hopeful that this will be our safest year ever. It's difficult to know precisely what the future holds for naval aviation safety. Rather, let's take a moment to look back — way back, some 485 years.

The first attempt to formalize aviation safety was promulgated by *the* master of arts and technology, Leonardo da Vinci, in about the year 1500 when he advocated the principle of redundancy of fail-safe design as follows:

"In construction of wings, one should make one cord (life wire) to bear the strain and a looser one in the same position so that, if it breaks under the strain, the other one is in to serve the same function."

Da Vinci's concept of redundancy, basic to aviation safety, was noted by Jerome Lederer, a longtime leader in aviation safety, in the 1985 Business Aviation Safety Journal. The concept is evident in multiengine aircraft and the duplication of control systems, navigation devices and instruments — not to mention the use of pilots.

A bit more modern philosophy of aviation safety began with the Wright Brothers, Lederer continues. In 1904, Wilbur Wright wrote, "Carelessness and overconfidence are usually more dangerous than calculated risks." Wisely, the Wrights first experimented with biplane kites to test various types of control and airframe designs. They were not satisfied until they had practiced about 1,000 glider flights on the dunes at Kitty Hawk.

Safety also figured in their placing the engine to one side in their first powered airplane to prevent the engine from falling on the pilot in case of a mishap. The Wright Brothers believed strongly in the use of simulators, particularly one that instilled safe habits in their student pilots concerning correct rudder operation. Today our simulators contribute substantially to safe piloting.

Yet, much had to be learned by trial and error, some of the errors were extremely costly. Naval aviation's first fatality occurred on June 20, 1913, when a strong gust of wind threw Ens. W.D. Billingsley out of his Wright B-2 to his death near Annapolis, Md. His observer, Lt. John H. Towers, stayed with the plane as it crashed into the water. He survived but was injured severely.

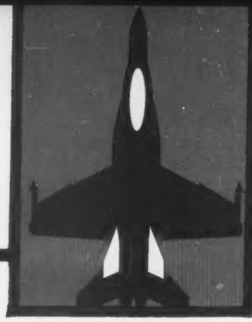
"It is important to recognize that safety is a relative concept," Lederer emphasized. "Absolute safety toward which we strive is not realizable but poses a constant challenge. In any case, it is arguable whether a risk-free society would be desirable. Without risk, progress would be inhibited. Advances in flight safety result from our increasing ability to fine-tune the calculations."

And so it is with naval aviation safety, particularly in a combat environment. In the new year immediately ahead, we know we won't have a zero mishap rate and we know that we won't have any *really new* mishaps — just new people making the same old mistakes. *You* can learn plenty from *the other guy's* blunders, though. That's why we at Approach keep publishing articles about mishaps, including the mistakes that caused them. This helps keep some of those mistakes from being repeated.

Bud Baer
Approach Staff

inside approach

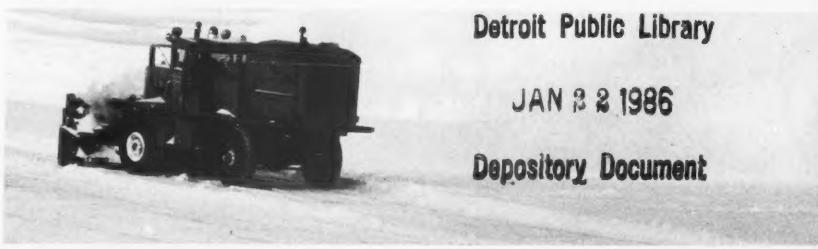
Vol. 31 No.7



Cover design of an F/A-18A Hornet by Approach artist Blake Rader.

FEATURES

DEPARTMENTS



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Undoubtedly such a real-life tragedy serves to reinforce our profound respect for some of winter's elements, particularly those that can have a devastating effect on aircraft performance. With the winter weather upon us, perhaps a review of various fundamentals will serve to better prepare us for some of the inherent

Hazards of Winter Operations II

An updated version of an article in the Jan '84 Approach

By Lcdr. Joseph F. Towers and Porter J. Perkins

Frozen as an instant in time, the final realization occurred — thê kind that precedes eternity. Now, amidst the obscurity of the flurrying snow, the doomed and ice-laden Boeing 737 had already begun its earthbound plummet.

PALM 90 had just departed runway 36 at Washington's National Airport in a moderate to heavy snowstorm with low visibility. The aircraft was slow to accelerate and failed to achieve an adequate climb prior to impacting the heavily traveled 14th Street bridge. It then plunged into the icy Potomac. The consequences of the catastrophe were soon apparent with 74 of the 79 occupants killed by impact or drowning along with four others on the bridge.

The National Transportation Safety Board determined that "the probable cause of this accident was the flight crew's failure to use engine anti-ice during ground operation and takeoff, their decision to take off with snow and ice on the airfoil surfaces of the aircraft and the captain's failure to reject the takeoff during the early stage when his attention was called to anomalous engine instrument readings. Contributing to the accident were the prolonged ground delay between deicing and the receipt of ATC takeoff clearance during which the airplane was exposed to continual precipitation, the known inherent pitchup characteristic of the 737 aircraft when the leading edge is contaminated with even small amounts of snow or ice and the limited experience of the flight crew in jet transport winter operations."

Are yóu tired of hearing the same info every winter? Probably so. But we're now finding out that some of our former, previously established textbook information on icing isn't quite the way we thought. Not only has some of the information changed, but so has this format. And of course, some things never change — such as the absolute necessity for cockpit discipline and strict adherance to operating directives — a sure bet for keeping us out of trouble most of the time. Well, so much for the introduction . . .

Physical Principles of Aircraft Icing

Aircraft structural icing is the accretion of ice on leading edge surfaces caused by the impingement of supercooled water droplets during flight. This adhesion normally involves *liquid moisture* and *subfreezing temperatures.*

Icing will occur in-flight when (1) the air temperature is below freezing by a specified amount, (2) some liquid water is present and (3) the water droplets are large enough to strike an aircraft component. Further, the time of exposure to these conditions must be enough to form a discernible amount of ice.

Certain characteristics of meteorological icing conditions require further explanation. Specifically, the temperature of the clouds or liquid water must be below freezing by an amount equal to or greater than the wet-air kinetic temperature rise on the exposed surface as determined by the penetration airspeed. Most ram air temperature (RAT) probes register the kinetic energy rise and closely approximate the total air temperature (static air temp + kinetic rise). Thus *ice will form when the RAT is between 0 degrees and -15 degrees Centigrade.* As the temperature drops below this prime icing zone, there is a lower probability of encountering ice accumulation. For example, if the outside air temperature (OAT) is below -20 degrees Centigrade, the chance of encountering ice is only 14 percent. This may be explained by the fact that most clouds containing temperatures which are below freezing begin a process known as glaciation, which is the transformation of liquid water droplets into ice crystals. The colder temperatures result in an increased rate of glaciation.

For those of us who enjoy a bout of mental gymnastics in simplified, mathematical linguistics, the theoretical ice thickness that accretes, (I in inches), is given by

$$I = .0634\,(WDE) \div \rho \quad (\rho\text{: Greek Letter "RHO"})$$

where W is the water content of the cloud in grams per cubic meter, D is the distance flown in the icing clouds in statute miles, ρ is the density of the accumulated ice in grams per cc and E is a dimensionless quantity called the collection efficiency. Values of collection efficiency depend upon airspeed, sizes of the water droplets and the size and shape of the moving surface.

Airfoils have collection efficiencies which may vary from near zero for very small droplets and large radius of curvature airfoils to nearly 100 percent for large droplets in freezing rain on airfoils with little curvature. However, for small, sharp objects such as antenna masts, pitot tubes, wiper blades and propellers, the collection efficiency is very high, regardless of droplet size. This means that *small water droplets are more easily deflected at lower airspeeds by blunt objects* with a large radius of curvature. Hence, there is a lower rate of ice accretion per unit area. Conversely, *larger water droplets at higher airspeeds more easily impact upon sharp, pointed surfaces* due to the inability of the water to be deflected in the surrounding airstream. Hence, there is a higher rate of ice accumulation for the same atmospheric conditions. Can you imagine what would happen to a pitot tube without anti-icing?

The *rate of ice accumulation* often depends on whether you are in a stratiform cloud or a cumulus cloud with extensive vertical development. For example, under the same temperature conditions, ice will build up twice as fast in cumulus clouds because of their high water content; but the icing flight path in cumulus clouds is usually not as long as that of layer or stratus clouds. Also, as penetration airspeed increases, ice rate of accumulation increases. This is true up to about 350 to 400 KIAS where ice formation gradually dissipates due to skin friction heating. (This aerodynamic heating is the temperature rise at the stagnation point resulting from adiabatic compression and friction as the aircraft moves through the atmosphere. The amount of heating varies primarily with indicated airspeed and altitude. Dissipation should result when the total air temperature, outside air temp plus aerodynamic heating, reaches about +2 degrees Centigrade or higher.)

NOTE

Research indicates that the same atmospheric icing regions can produce dramatically different effects depending on aircraft type, configuration and airspeed.

Characteristics of Ice Accretion. *Ice accretion shape and amount* have a dramatic effect on aerodynamic performance. The shape of the buildup is the result of the *rate of freezing* which occurs on the surface. Low temperatures, low droplet impingement rates (water concentration by velocity) and small water droplets promote rapid freezing on the icing surface. Such conditions produce a rather smooth and pointed shape that is usually rime in nature. Whereas temperatures near freezing, with large water droplets, result in slight delays in freezing when the droplets impact the surface. These conditions create irregular ice formations with flat or concave surfaces sometimes having protuberances facing the airstream either side of center line. Ice accretion amount or size is primarily a function of exposure time to the icing conditions.

NOTE

Frozen water particles such as ice crystals, pellets and snow do not normally adhere to aircraft surfaces in flight and therefore present little accumulation hazard, with possible exception of *inlet type ducting* with *internal curvatures*.

Types of Structural Icing. *Frost.* Aircraft frost formation is the *deposit of a thin layer of ice* which forms on exposed surfaces under certain atmospheric conditions. It frequently occurs when the surface temperature is below freezing during night radiational cooling, in a manner similar to the formation of dew and frost on the ground. In-flight, when descent is made from subfreezing air into a warm, moist layer, frost may also form. The effects of frost are perhaps more subtle than the effects of ice on the aerodynamic characteristics of the wing. The accumulation of a hard coat of frost on the upper wing surface provides a texture of considerable roughness. While the basic shape and aerodynamic contour is unchanged, the increase in surface roughness increases skin friction and reduces the kinetic energy of the boundary layer. The net result is an increase in drag and reduction in lift. This fine crystalline ice formation is often barely visible. However, it can easily distort the normal air flow over wings and control surfaces enough to adversely affect the takeoff characteristics of an aircraft.

WARNING

If frost is severe enough, it is possible that the aircraft may not become airborne due to the premature stalling of the wing prior to rotational speed (Vr).

Rime Ice. This type of ice is formed by the *instantaneous freezing of supercooled water droplets upon impact.* These supercooled droplets adhere in a spherical shape while trapping air within the ice form, thereby giving it an opaque, milky appearance.

Clear Ice. Clear icing is frequently encountered in areas of *freezing rain* in *temperature regions slightly below freezing.* Freezing rain occurs when liquid precipitation falls from overrunning warm air, which is slightly above freezing, into cold air, which is slightly below freezing. The rain becomes supercooled as it falls through the cold air mass and will freeze when it comes into contact with aircraft surfaces. Thus, an aircraft flying through an area of freezing rain can easily acquire a coat of heavy clear or glaze ice. Freezing rain may be encountered while flying in the colder air mass of both warm and cold fronts.

Glaze Ice. This type of ice is sometimes referred to as clear ice, but in fact it is a cross between clear and rime ice in terms of appearance. Glaze ice lacks the new snow semblance and smooth surface of rime ice and tends to possess a white appearance, in contrast to the near transparency of clear ice. Glaze ice is formed by delays in freezing of liquid moisture creating rough, irregular ice formations. Some meteorological conditions can produce a mixture of glaze and rime in the same ice accretion.

NOTE

Inflight ice testing reveals that the most severe glaze icing occurs when the outside air temperature (OAT) is between -1 degree and -5 degrees Centigrade. At colder temperatures between -8 degrees and -10 degrees Centigrade, there is a less severe type of mixed (glaze and rime) icing. As temperatures decrease to -11 degrees to -15 degrees Centigrade, rime ice is most likely to form. At about -20 degrees Centigrade and below the probability of ice accretion is significantly reduced.

When the OAT is at or below -40 degrees Centigrade, the atmosphere does not normally contain moisture in the liquid state. Therefore, any atmospheric moisture will be in the solid or crystalline form and ordinarily presents no accumulation hazard.

The type of icing which most adversely affects aerodynamic performace appears not to be clear-cut. However, what is most important is the *shape and amount of the ice formation* and not necessarily the type. Distortion of the airfoil and disruption of airflow is far more significant in destroying lift and increasing drag and this occurs under all conditions of

icing. Moreover, most in-flight icing which occurs is of a mixed variety and retains the combined characteristics of all types of icing.

Caution

At low atmospheric temperatures, late activation of wing anti-ice systems on a heavily iced leading edge can allow the melted run-back to refreeze on upper and lower wing surfaces. Always utilize anti-ice systems PRIOR to icing encounters.

Aerodynamic Icing Penalties. Airfoil surfaces were designed and manufactured to certain desired specifications. Structural icing distorts the shape of airfoils, control surfaces and the basic airframe.

The net result is:

- increase in drag
- reduction of lift
- reduction in performance
- increase in weight
- increase in fuel consumption
- increase in stall speed (VS)
- reduction in stall angle of attack

Ice Accumulation Classification. The following definitions apply to rates of accumulation for pilot reporting classifications.

Trace — icing becomes perceptible, not hazardous unless encountered for an extended period of time.

Light — rate of accumulation may create a problem if flight is prolonged. De-icing and anti-icing equipment is sufficient to reduce or eliminate buildup when utilized. Ordinarily, no hazard is presented.

Moderate — rate of accumulation is such that even brief encounters can become potentially hazardous. The use of de-icing/anti-icing equipment or diversion is required.

Severe — a high rate of accumulation where de-icing anti-icing equipment is inadequate to reduce or control the hazard. Immediate diversion is necessary.

And remember, when reporting icing, always specify your aircraft type.

NOTE

Ice deposits of one-half inch on the leading edge of certain airfoils can reduce their lift by nearly 50 percent, increase drag by an equal percentage and greatly increase stall speed.

Jet Engine Intake Icing

Jet engines are susceptible to icing. The engine cowling, bullet, inlet guide vanes, first stage compressor blades, etc., can collect ice under the same general conditions that cause exterior icing.

A hazard exists since icing of this type can result in a reduction in inlet airflow, engine internal pressure, net efficiency and the resulting thrust ultimately produced.

A secondary but equally as hazardous effect of intake icing is the increased possibility of:

- compressor stall
- ice ingestion
- internal damage
- flameout

NOTE

Conditions exist under which jet engine icing can occur without wing icing. Icing occurs when the adiabatic expansion reduces the air temperature in the engine inlet; ingested water droplets which impinge on the engine inlet components will freeze. This phenomenon may occur during ground and takeoff operations, when the aircraft velocity is low and engines are operating at high thrust setting. This condition can exist up to + 5 degrees Centigrade in visible liquid moisture (drizzle, fog, etc.) or when the dew point is within 3 degrees Centigrade of this ambient temperature range.

Engine pressure ratio (EPR) is the ratio of engine turbine exit pressure to compressor inlet pressure.

This important ratio, whether called EPR or known by another name, depending on the particular engine or aircraft type, is an indication of the amount of thrust being produced.

WARNING

A compressor inlet pressure probe blocked with ice will result in incorrect engine thrust readings. Under such conditions when takeoff thrust is set, the EPR indicator will register a thrust setting that is higher than the engine is actually producing. ALWAYS cross-reference ALL engine instruments to ensure proper engine operation and thrust development when applying takeoff power.

Aircraft Ground Deicing

When it is necessary to remove ice, snow or frost prior to flight, a solution of ethylene glycol and water should be applied to all aerodynamic surfaces. During conditions when ice or snow is continually accumulating during ground operations, the takeoff should be made within 30 minutes of application. A final physical check of the surfaces should be made just before takeoff to ensure surfaces are still free of ice.

WARNING

De-icing fluids do not protect against re-icing that can occur from falling precipitation.

FAR 121.629 Operations in Icing Conditions

(a) No person may dispatch or release an aircraft, continue to operate an aircraft en route, or land an aircraft when in the opinion of the pilot-in-command or aircraft dispatcher (domestic and flag air carriers only), icing conditions are expected or met that might adversely affect the safety of the flight.

When visible moisture is present and the outside air temperature (OAT) or ram air temperature (RAT) is 6 degrees Centigrade/42 degrees Fahrenheit or below, utilize engine anti-icing During All Ground and Flight Operations.

Climb, Cruise, Descent and Landing

Ice collected during climb will reduce rate of climb and range.

If excessive ice formation remains after the use of anti-icing/de-icing, attempt to exit the icing environment in which liquid water exists in the zero degrees to -15 degrees Centigrade range by climbing or descending.

Always utilize engine/airfoil anti-icing as specified in the operating manual. The preferred method is to activate these systems PRIOR to encountering the anticipated icing conditions.

WARNING

Heavy ice accumulation greatly increases the stalling speed; therefore, airspeed should be increased during low altitude flight, approach and landing under such conditions.

Hydroplaning

The presence of winter contaminants on a runway surface disrupts the contact between the tire footprint and the pavement. This interferes with the development of the frictional or tractional forces required for directional control and effective braking.

Dynamic hydroplaning occurs when the standing fluid is not displaced from under the tire at a fast enough rate to allow the tire to make contact over its entire footprint area. This type of hydroplaning may be either partial (a portion of the tire is still in contact with the pavement) or total (the tire is completely detached from the surface). During this type of hydroplaning, the aircraft is either partially or totally supported by the fluid pressure between the tire and the pavement.

Caution

Hydroplaning can result in the complete loss of tire friction, steering and braking.

During total dynamic hydroplaning, wheel rotation can stop completely. Research has determined that minimum total hydroplaning speed in knots to be equal to nine times the square root of the tire pressure:

$$V=9\sqrt{\text{tire pressure}}$$

where V is the minimum total dynamic hydroplaning speed in knots and the tire pressure is in psi.

This equation also holds true for a rotating tire as it travels from a dry to a flooded runway section. Ongoing investigations revealed that whenever an aircraft touches down on a flooded surface, the hydroplaning speed for a nonrotating tire was slower than the original NASA equation for a rolling tire. Consequently, the derived equation for a nonrotating tire is:

$$V=7.7\sqrt{\text{tire pressure}}$$

Both equations serve as an excellent approximation of the minimum ground velocity for an aircraft to hydroplane. If a runway surface is rough, grooved or textured and the tires have good tread depth, then the fluid depth must exceed both the tread and runway groove depth for hydroplaning to occur.

At slow speeds, the aircraft tire mass is sufficient to displace the fluid beneath it. It is primarily at higher speeds where the fluid cannot escape, that the tire is lifted off the surface and hydroplaning occurs.

Viscous hydroplaning is a technical term used to describe the normal slipperiness or lubricating effect that occurs on a wet surface. This type of hydroplaning can occur at speeds well below that required for total dynamic hydroplaning.

Reverted rubber hydroplaning can occur whenever a locked tire skids across a slippery wet or icy surface. The result is the generation of some very high temperatures (up to 600 degrees Fahrenheit/315 degrees Centigrade) due to friction. Steam is produced which serves as a lifting medium on which the tire rides above the pavement. The steam heat reverts the rubber back to its black, gummy, uncured state.

Recommended techniques for landing whenever hydroplaning is anticipated include:

- Land at the slowest possible approach and touchdown speed to decrease the time for potential hydroplaning.
- Make a firm touchdown.
- Employ all available means to safely and expeditiously decelerate the aircraft (spoilers, anti-skid braking, thrust reversers, field arrestment, etc.).
- When anti-skid is inoperative or not available, judiciously apply brakes. Exercise caution to avoid locking tires which could result in a blowout as the aircraft crosses over a dry runway section.

Continued

N.T.S.B. Synopsis

Some of the National Transportation Safety Board's recommendations and statements made on the subject in January 1982 are summarized below:

Flight crews should be familiar with the potential hazards associated with engine inlet probe icing. Furthermore, all engine instruments should be cross-checked during the application of takeoff power.

All flight personnel should be aware of the inability of de-icing fluids to protect against re-icing resulting from precipitation following de-icing.

Flight crews should become aware of all aspects of cold weather operations when they are so engaged, with emphasis on aircraft performance when a runway is contaminated with snow or slush for takeoff.

Flight crews should be required to visually inspect wing surfaces before takeoff if snow or freezing precipitation is in progress.

Ensure compliance with FAR 121.629(b) which PROHIBITS takeoff if frost, snow or ice is adhering to the wings or control surfaces.

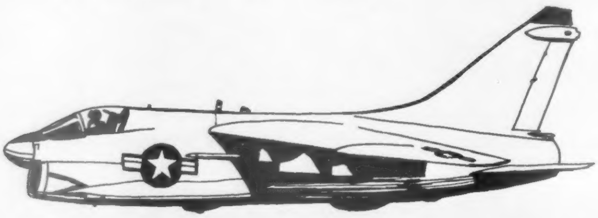
A runway contaminated with snow, slush or water can severely decrease takeoff performance by preventing the aircraft's acceleration to rotation speed due to the increased resistance of the contaminants against the tires.

Aerodynamic lift is degraded by contaminated airfoils.

Engine and airfoil anti-ice should be utilized prior to and during takeoff.

WARNING
In cold weather, make sure all instruments have warmed up sufficiently to ensure normal operation.
Exposure to cold, slush and ice accumulation can make aircraft systems react in unusual ways. Always cross-reference all instrumentation and systems.

Understanding the basic fundamentals of cold weather operations is absolutely essential to all-weather flight safety. These thoughts will hopefully contribute to the safe and effective operation of our aircraft during the upcoming winter weather.

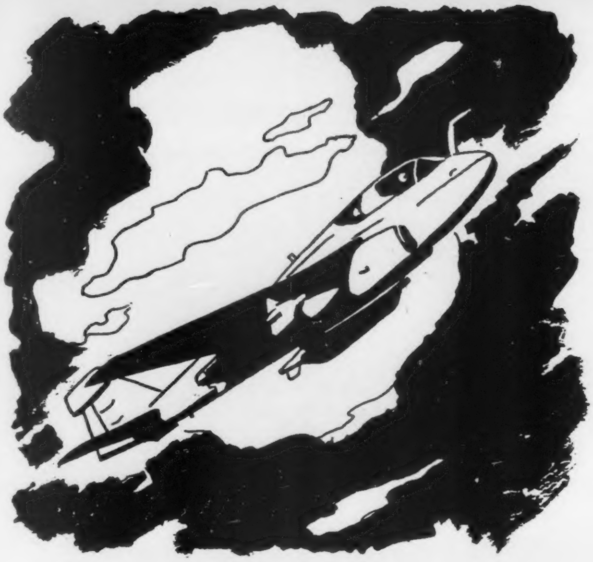


One Final Thought

The pilot in command is directly responsible for and is the FINAL AUTHORITY with regard to the operation of that aircraft.

Aircrews should review Section IV of their NATOPS manual. This all-weather operations section will provide specific information on cold weather operations. Also, more information is available from Meteorology for Naval Aviators and the Inflight Information Handbook, Department of Defense.)

Lcdr. Towers has made a career-long study of the relation of meterological phenomenon to aircraft performance and has been published on the subject in a wide variety of aviation publications. A naval aviator, he flew S-3s on active duty and currently flies 767s for American Airlines as well as C-9s for VR 57, a reserve squadron based at NAS North Island, Calif.
Mr. Perkins is a senior aerospace engineer with Sverdrup Technology, Inc., at the NASA Lewis Research Group, Cleveland, Ohio.



Who's Watching Who Out There?

By Lcdr. R.E. Adamson

IT was supposed to be an "easy" air intercept hop off of the CV. What happened? Did I brief the hop wrong? Were the aircrews looking at the front board that said "Pay your Mess Bill," "Several Os need haircuts," and "CAG sez land on centerline"? The hop consisted of a flight of two F-14As, two F/A-18s and an EA-6B. My usual RIO was med down, so I tried to be a little more thorough than I would have usually been during the brief. We planned a flight of three vs. two; one F-14A and two F/A-18s against the EA-6B and F-14A. The aircraft would alternate on the same JAMMER to see how the AWG-9 and the RIOs did in a jamming environment.

I announced that I would be the Tomcat aircraft on the EA-6B, so the rendezvous would be at 12,000 feet overhead the CV. A common frequency was agreed on for all aircraft.

Preflight, start, taxi and the night cat shot were all normal. (Do normal people do night cat shots?) I stayed in burner till 5,000 feet to make sure that fuel transfer was normal, and that the VSI/altimeter all worked in accordance with NATOPS. I executed a standard case III departure, arced and then headed outbound. I climbed to 12,000 turned inbound looking for any other traffic at my altitude. We completed our airborne weapons checks, and then did the on-board check. I established myself at 250 KIAS overhead the CV and started looking for the EA-6B. It wasn't the best night to go flying (no moon and dark). I saw the EA-6B after his "airborne" call and watched him climb and commence his departure. After five minutes I saw the EA-6B at 7 o'clock and three miles, and told my RIO that this reminded me of my tour in the training command in TA-4Js. One of the more colorful hops in the TRACOM was the night formation/rendezvous hops. As the IP, you could control closure with power, but you were always ready for anything that could happen. Most of the time a high-speed underrun would evolve from too high a closure rate. I mentioned to my trusty RIO that we could head out to station after about 180 degrees of turn (when the EA-6B was aboard), and to start working with the E-2. At about this time (one NM) I saw the closure start to increase. I started to get that sick feeling all naval aviators get when something is not going quite right. I added full power and aft stick and watched the Prowler do a classic high-speed underrun, missing me by some 60 feet. Non-standard ICS comms were exchanged between the RIO and me concerning this inept attempt at a rendezvous.

I decided that this time **I** would control closure from the wingman's position. We joined up and the hop went as briefed.

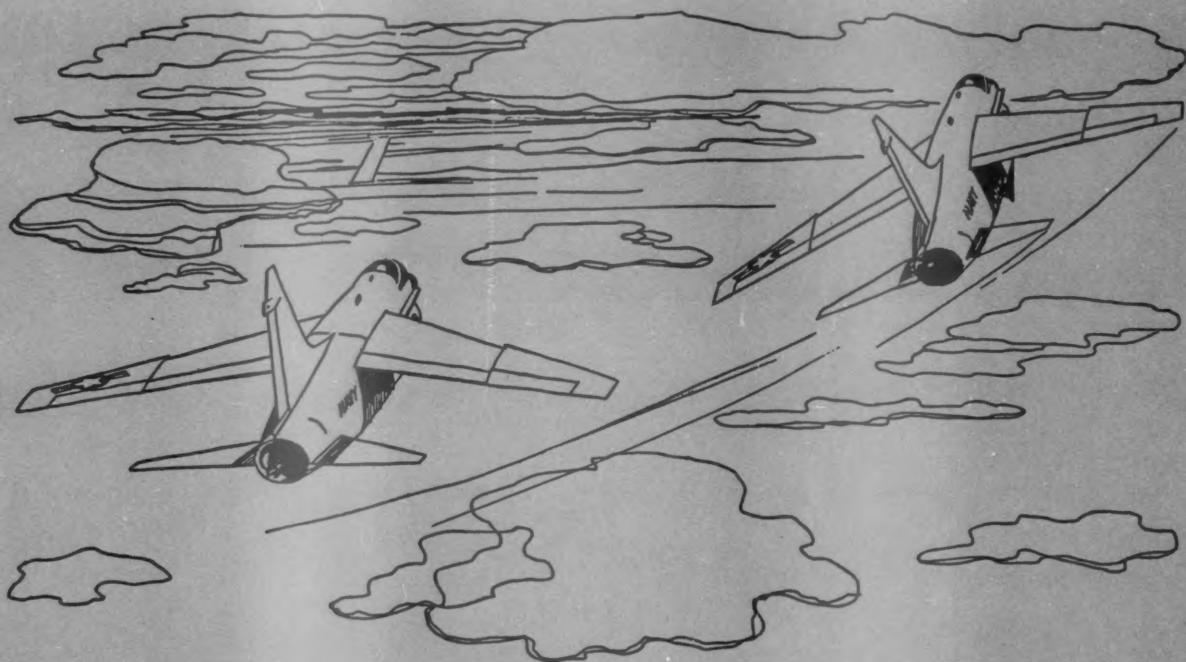
When we debriefed I asked one of the ECMOs what happened overhead the boat. His answer startled me! He said "nobody saw the F-14 till a path of light crossed over their canopy." The pilot, according to the ECMO, thought I had buzzed him at night. (You've got to be kidding.)

As I sat down later to think about what had happened, I just couldn't understand what those four sets of eyes were doing during the join-up. The Christmas tree light show that the F-14 puts on is greater than that of an A-6/S-3/A-7; nevertheless, they didn't see us.

What did I learn?

- The same thing that they teach every future naval aviator in the TRACOM; somebody out there is trying to shorten your life span.
- Don't forget the mission at hand is to join-up (safely), **then** do the mission.
- The JAMMEX would never have happened if a midair collision had occurred.
- That there is no such thing as a "normal" hop around the CV, so watch out. It would be nice to have an R2-D2 in the cockpit to help you but we don't so let's keep our heads on a swivel like Linda Blair in the "Exorcist." Don't forget, the only person out there who is really watching out for you is yourself.

Lcdr. R.E. Adamson began his naval aviation career as an S-3A pilot. After a tour in the training command as a TA-4J instructor he transitioned to the F-4 and finally the F-14. He recently completed his second sea tour with VF-21 and now is an instructor pilot in VF-124.



Lucky Corsairs — NMAC. The air was crowded near the active southeast NAS. Nothing new. With several fleet and fleet replacement squadrons on the field, as well as an active municipal airport 10 miles to the east, activity in the area was usually fairly high. Weather was clear, visibility over seven miles. The usual collection of large puffy clouds also contributed to visual congestion.

The pilot of an A-7E was advised to come right 30 degrees to avoid overtaking an S-3 during an approach to the NAS. The Corsair driver complied and then switched frequencies to contact the Center. The Center controller instructed him to slow to 250 KIAS and to come right an additional 20 degrees. His new heading was 150 degrees. Lifting his head from the cockpit, the A-7 pilot was startled to see another A-7 with its speed brake extended only 150 to 200 feet from his own A-7. The second Corsair passed left to right at the same altitude, close enough for the first aircraft's pilot to hear the engine.

The pilot of the second A-7 had been told to turn off his IFF since it was emitting only an emergency squawk. He then experienced an EMS caution light and subsequently declared an emergency. While under vectors to the NAS and descending from 14,000 to 5,000 feet, the pilot of the second Corsair spotted the first A-7 and initiated evasive action to avoid a midair.

No traffic advisory calls had been given to either Corsair, and the second A-7 with the secured transponder and in-flight emergency had been cleared direct to the NAS. Neither the controller of the first A-7, nor the arrival controller of the second aircraft, had exact information on either aircraft; the arrival controller, working the second A-7 with the emergency, did not have the first aircraft at all.

How Do You Like It So Far? The student naval aviator (SNA) waited anxiously for his pilot before a first-time-ever orientation hop. With no previous flight experience, the SNA did not know exactly what to expect, and the quick breakfast of cold cereal a short time before did not sit well. However, he and his instructor pilot (IP) took off on schedule, climbing to 8,000 feet on a standard departure. As the IP began the instructional phase of the flight, describing and demonstrating various transitions in the T-34C, the SNA said he felt warm and turned on the air conditioning. Two minutes later, with the aircraft in a one-G climb, at 120 KIAS, the SNA passed out and failed to respond to repeated calls from the IP. The student was unconscious for 10 seconds, after which he regained consciousness and said he felt fine.

The IP discontinued the flight and returned to the field. The SNA was

sent to the base infirmary and thoroughly examined. He was suffering from dehydration, fatigue and air sickness.

A barrage of alien information is thrown at students as they begin the arduous period of flight training. The information ranges from mechanical and aerodynamical to physiological and military in content. A lot to absorb, consider and use. Somewhere, buried in this mass of information was material on flying and the body and the mind. Perhaps this SNA forgot. Maybe he just didn't think about it seriously, or believe he could fall victim to the results of not eating properly or psychological stress. But he did! The training squadron CO's comments were, in part:

"The training command for an SNA is a very demanding environment and one that should not be taken lightly. The best defense against the stresses . . . is to heed the medical advice all SNAs receive . . . reinforcement of these basic principles must remain a squadron responsibility." — Ed.

Vapor in a T-2. During the takeoff roll on his first T-2 familiarization flight, a student naval flight officer (SNFO) noticed vapor in the rear cockpit. Because he had heard the T-2 air conditioning system is effective and fog is observed when throttles are advanced to military, this condition was not brought to the attention of the instructor. The source of the vapor, however, was not air conditioning but oxygen leaking out of the hose after it had become detached from the mask during the ground evolution. The SNFO continued to breathe ambient air through the inhalation valve and, other than a mild cooling sensation felt in the area of the chin near the O_2 mask, nothing unusual was noticed. The cooling sensation was again discounted because of the anticipated effectiveness of the environmental cooling system of the aircraft.

After flight at altitudes of up to 17,000 feet, the Buckeye returned to homefield for landing demonstrations. In the groove for a touch-and-go landing, the instructor pilot (IP) ran out of oxygen. The IP immediately removed his mask and called the tower for a full-stop landing. The student was instructed to remove his mask and secure his oxygen switch, though he reported that he had no difficulty with breathing from the mask.

After an expeditious shutdown, the cause of the oxygen depletion (and the vapor noticed by the student) was determined to be the hose coming loose at the Tinnerman clamp of the inhalation exhalation valve on the MB 1210 mask. Approximately six litres had been depleted during the 45-minute flight.

Following the flight the student complained of a tingling sensation and swelling in the lower jaw area. A flight surgeon was notified and the student was sent for a medical checkup. Frostbite on the chin and lower face area was dignosed, caused by the unrestricted flow of cold oxygen onto exposed skin below the mask.

It should be noted that during the unusual occurrence, the reduction in the level of O_2 and subsequent caution light were not noticed. The oxygen low light had come on but was not visible due to the aged condition of the lens and the position of the sun shining on the instrument panel throughout the VFR field entry at the busy airfield. The student on the other hand was reluctant to press the issue of the vapor noticed early in the flight because he was not sure what was "normal" and didn't want to appear unknowledgeable. All aircrew should be reminded by this incident that if something doesn't feel or look right, it probably isn't. Inexperienced aviators should be encouraged to ask those "stupid" questions. In this case a naval flight student suffered only a scar requiring several weeks to heal. The potential for hypoxia, reduced range imposed by altitude restrictions and increased fire hazard in the cockpit are all dangers which may have played a part in a slightly different situation.

Submitted by Lt. James H. Foss

Helo Medevac. The Coast Guard HH-3F arrived over the civilian cargo ship to medevac a heart attack victim. Although the two pilots had discussed the best location on the ship to conduct hoisting operations, the master of the vessel made their decision for them, dictating that the hoist be accomplished from the bow. The master felt there were too many obstructions at the stern.

The helo began the hoist from an altitude of 125 feet. With the relative wind 30 degrees off the port bow, the co-pilot, in the left seat, flew the aircraft since he had a better view of the hoist reference point. A corpsman was lowered toward the deck to evaluate the victim's condition. At this time, the flight mechanic was beginning to lose sight of the hoisting area, as was the co-pilot.

The aircraft drifted into an area with booms and cables, and the corpsman, still on the hoist, hit the obstructions. The co-pilot, under the direction of the flight mechanic, brought the helo back to an even keel, and the corpsman was hoisted back on board. The corpsman was examined and found to be relatively uninjured and assisted in finally getting the heart attack victim into the aircraft. When he was further examined after recovery, the corpsman was found to have bruised ribs.

One-third of the squadron's crew, maintenance and administrative personnel have been transferred and their replacements are beginning to come up to speed. The crew list has been juggled for the "final" time. You and your squadron are ready to deploy . . . or are you?

Is Your Squadron

By LCdr. Don Stanton

YOUR squadron has finished a busy at-home and turn-around period and everyone is trying to enjoy the last few months stateside before heading overseas. Realizing the stresses faced in the squadron and at home, you and your squadronmates are starting to mentally gear up for deployment. About one-third of the squadron's crew, maintenance and administrative personnel have been transferred and their replacements are beginning to come up to speed for the upcoming deployment. The crew list has just been juggled the "final" time before the mining readiness certification inspection (MRCI) and the operational readiness evaluation (ORE). You and your squadron are ready for deployment . . . or are you?

Those new people who checked aboard and are finding themselves being rapidly placed into aircrew and maintenance slots — have they been assimilated into their crews and shops or are things still a little uncoordinated and rough around the edges? Maybe those newly formed aircrews and loading teams need a few more practice runs before they're thrown into the real MRCI and ORE.

Speaking of crew coordination, when was the last time you conducted a practice ditching, bailout, fire of unknown origin or rack overheat drill with your newly formed crew? Hmmm . . . maybe everyone really doesn't know how to carry out his duties "in accordance with NATOPS" as you're so apt to say during the crew brief.

Our squadron is no different than your squadron. We all face the same hoops, trials and tribulations as we prepare for deployment. In an effort to improve crew coordination, increase hands-on training and build confidence, we decided to try the following ideas:

- "Wet" ditch training at the base pool consisting of maneuvering across the pool in Imperial anti-exposure suits, inflating a life raft in the water and participating in a crew scenario which included a simulated unconscious PPC or TACCO.
- Darkened aircraft ditching and bailout drills with crew members wearing blackened goggles to simulate a "pitch black night and sinking" situation.
- LPA blindfold drills and equipment checks.
- Surprise rack overheat drills on ready preflights and increased emergency drills on routine flights.

Donning Imperial anti-exposure suits take knowhow and practice and sometimes a little bit of help.

- Increased dedicated field work (DFW) flights and right-seat work for pilots.
- Increased emphasis on cockpit navigation and flight station coordination with the navigator.
- An aggressive "Drive Safe" program.

Here are some of the lessons we learned:

Wet Ditch Drills — Our aircrews were enthusiastic about the pool ditch training and learned a lot from their efforts in putting on anti-exposure suits (borrowed from DWEST). We explained that this evolution was *not a swim test*, but rather

nSafe to Deploy?

Maneuvering a loaded life raft across the pool is part of the "wet" ditch training. It takes a good deal of crew cooperation and coordination.

an opportunity to use our survival equipment.

Crews discovered who their weak links might be in a survival situation and who to keep an eye on in the water.

We tried to emphasize use of the buddy system while putting on anti-exposure suits and when in the water.

If a crew discovered someone "passed out" and floating a distance from the raft, it was better to try to maneuver the raft to pick him up rather than risk losing a crew member trying to swim to save him in "frigid" water.

Flight station personnel cannot easily wear Imperial anti-exposure suits in the cockpit so we had them practice putting their suits on in the water in a "worst case" situation. (We found that this usually took more than three minutes.)

We learned that much time could be saved if the Imperial anti-exposure suits were stored on the back of aircrew ditching station seats.

Some LPA "D" ring chest straps were not long enough to buckle over the top of Imperial anti-exposure suits.

Tall and short people have some problems while donning and wearing the Imperial suits. Crew members should be

Two "survivors" make their way across the pool in their anti-exposure suits.

Inflating the raft in the water is easier said than done but practice makes it simpler.

ready to help these people if they experience problems.

If the plane was filling up with water, most people in anti-exposure suits could still duck underwater and make it out an overwing exit without bobbing to the top of the cabin. Most of our people wearing anti-exposure suits could walk into water about chest deep without floating; however, lighter people had more problems.

Darkened Aircraft Drills — Aircrewmen appreciated a chance to build their confidence with blindfolded, hands-on experience in getting at their equipment and making their way to overwing exits.

We put reflective tape around the overhead rail in a spiral fashion near overwing exits so that people could see and feel their way to an exit. Another suggestion was to vary the length, thickness or number of turns of tape so that a disoriented individual could determine which exit he was near.

When using frequency 282.8 on the PRC 90 at night, aircrewmen must remember to push in on the front selector to make it work.

As a result of their experiences in darkened goggles, and a worst case scenario, crews were motivated to increase the frequency of emergency drills during normal flights.

LPA Flight Gear Checks — We found several instances of worn equipment, depleted batteries, strobe lights left turned on, etc., which raised the attention level of aircrewmen to

Here's a survival scenario where a crewman is receiving medical attention. He's just coming around after being "knocked unconscious."

their survival equipment.

Some aircrewmen carry personal items in survival vests and some required survival equipment was not stored in the correct position.

We also discovered that some of the bottles of drinking water included in the LPAs could use more frequent changing and recommended that all aircrewmen change their own water at least every 30 days.

Rack Overheat Drills — Surprise rack overheat drills during ready alert preflights helped to show crews their weak areas and motivated them to conduct more emergency drills on a regular basis. Some common mistakes noted were lack of crew coordination and personnel forgetting to wear gloves while searching for the rack overheat.

Dedicated Field Work (DFW) — We increased the frequency of DFW flights for our pilots to increase confidence and improve their right-seat work. A new PPC fly 5 was incorporated into the pilot training syllabus to give our upcoming PPCs a solid right-seat background before they were designated.

Cockpit Navigation — During WSTs, crew training flights (CTFs) and regular flights, we encouraged pilots to concentrate on backing up the navigator with charts in the cockpit and frequent crosschecks. We emphasized coordination between navigator, TACCO, flight station and sensor three.

Drive Safe Campaign. After a recent rash of fatal and near fatal automobile and motorcycle accidents involving Navy personnel, it is becoming increasingly evident that potentially, the most dangerous activity for squadron personnel is *driving.* To combat complacency during our at-home cycle and to prepare for the squadron's deployment to Sigonella, Sicily (Italy has one of the highest motor vehicle accident rates in the world), we instituted an aggressive "Drive Safe" campaign. This campaign included a police driving specialist lecture, the "Convincer" seat belt impact demonstration; DUI penalty information; safety stand-down reminders; videotapes, POD, and flight schedule notes. Our overall intent was to highlight driver safety awareness and to increase the use of seat belts and defensive driving techniques.

The increasingly hectic pace of squadron turnaround cycles, combined with large scale personnel changes, can cause training challenges, stress and fatigue. However, a squadron has an opportunity to shape and improve itself for the upcoming deployment. An aggressive safety program including realistic hands-on survival equipment training can provide an avenue for increased crew coordination, confidence building and feedback which can assist your squadron in its preparation for deployment.

LCdr. Stanton is a P-3C patrol plane commander with VP-49, NAS Jacksonville, Fla. He recently completed a six-month deployment to the Mediterranean, operating out of Sigonella, Sicily.

The mainland flight looked good to me, but it wasn't long before I wondered . . .

What Happened To the Good Deal?

By Lt. Jody Richardson

I WAS attached to VC-1 in Barbers Point, Hawaii, as a first tour aviator from August 1981 to November 1984. In April 1983 Lcdr. Gary "Sluggo" Hagstrom and I were assigned to TransPac a TA-4J from Hawaii to San Diego and then on to Pensacola for scheduled depot level maintenance (SDLM). We then would bring a bird back to Hawaii from Pensacola. All in all, probably 10 days to two weeks on the mainland, with six cross-country legs thrown in. A great deal! With us on the TransPac would be a Marine TA-4 with two pilots and an Air Force KC-135.

The first time we tried to launch, the KC-135 was delayed due to auto-pilot problems, and by the time they got it worked out, we had missed our window for the TransPac. The mission was postponed two days. Now we're down to maybe a week on the mainland — a great deal downgraded to good deal.

The second time we launched, the Marine TA-4 couldn't depressurize his drops and then had one of his main landing gear extend. This made for some great pictures (he looked like a stork), but not so great for a TransPac. So, we limped home. The next available window to cross the pond wouldn't be until *four* more days. Now, as soon as we get to Pensacola, we've got to turn right around and beat feet for the West Coast so we can make the return TransPac. The good deal was now downgraded to a "not so good" deal.

Four days later we launched again. This time things went smoothly. All right, I thought, I'll just sit back, relax, take some pictures and help Sluggo with the flying! The refueling profile called for us to plug five times en route. This would permit us to bingo in case the tanker should go sour for any reason. For those of you who have never plugged a "135," it can be a real pain. You've got a boom with a short drogue at the end, and it's not nearly as comfortable as a KC-130, buddy store or any other system which reels the drogue in and out. Between refueling points 2 and 3, some bulges were noticed on the drogue. They didn't appear to present any danger so we pressed on.

At refueling point 3 the Marines went first, completed their top-off and stepped out of the basket. We moved into position and proceeded to make contact just as we'd done previously. As I was checking the external fuel quantity, I noticed a heavy mist going down the starboard side of the fuselage directly in front of the engine intake. I looked up to see fuel coming from around the in-flight refueling probe. We immediately started to back out. As we're doing so, I heard and felt a loud "bang" from behind me, accompanied by a fire warning light. This downgraded this "not so good deal" to a "disaster."

We were a 1,000 miles from the nearest land in a single-engine jet with a probable engine fire. And, buddy, I am P.O.'ed. I mean, this isn't a P-3 or something where we can feather No. 1 and press on. If that J-52 behind us wasn't going to get us there, we were not going to get there! The first thought in my mind was one of disbelief — I could not accept the fact that this was happening. This reaction was immediately followed by one of anger. The thought of ejecting had never really bothered me before — I always accepted it as an inherent risk of this business of flying tactical aircraft. But in accepting that risk I also assumed the "fact" that a SAR could be effected quickly. I knew this would not be the case here. You bet I was angry — angry at *where* I might have to punch out, halfway between Hawaii and San Diego!

After we backed out, Sluggo declared an emergency and turned towards home, since we weren't quite halfway across. I

could "feel" something wrong with the aircraft and I quickly scanned the engine instruments. Everything looked good with exception of the EGT, which was a little high at 620 degrees Celsius. About the time we finished the 180-degree turn, the Marines came up and said, "Your wing is on fire!" I looked back to see a large ball of orange flames coming from the area where the wing joins the fuselage. Sluggo must have been reading my mind, because about that time he yelled, "Eject, Eject, Eject!" I put my head back, grabbed the upper handle and pulled.

I felt an initial shock as I heard the canopy go and seat fire. I'm almost certain I experienced some "time expansion" as I saw myself going out. I had some disorientation due to the wind blast, but I did manage to see Sluggo leaving the aircraft right below me. The aircraft exploded about three seconds later. What is it they say? Lesson learned — "Know what criteria you will use for leaving an aircraft, and when those criteria are met, *get out!*"

I started a very rapid spin as I began free-falling. I thought about doing a "spread eagle" maneuver to try and stop the spinning, but since this was my first time airborne sans aircraft, I chose to remain in a fetal position with both hands firmly grasping the ejection face curtain handle. The spinning eventually stopped. The free-fall lasted for about two minutes before the chute automatically opened. The opening shock was hard — I firmly believe that keeping both hands on the ejection handle helped prevent any shoulder/arm injuries. Sluggo hadn't been as lucky. He had done a spread eagle to stop the spinning, and when his chute opened, he suffered a broken and dislocated shoulder with associated nerve damage.

I now began going through all my overwater ejection procedures. It's amazing how much of that stuff comes to mind when you need it. I even played around with my steering system, doing figure 8s overhead Sluggo, who was approximately 500 feet below me. I figured I might as well make the most of this "training."

I watched Sluggo hit the water. Steering into the wind, I prepared for my own water entry. As my feet hit, I only got the right-hand Koch fitting released due to the shock of hitting the water. However, the chute didn't drag me very far before I popped the left-hand fitting. Swimming clear of the canopy was no problem. I was very uncomfortable with my lower body in the water (Jaws!), so I got into my one-man raft as quickly as possible. I felt that I was probably experiencing an "adrenalin overdose," so I tried to relax and proceeded to drink some water. Only then did I look around for Sluggo and

The C-130 could see the other jumper lying in the water, face up. He never moved. No one knows what happened to him, he was lost that night. It was very disheartening to realize that someone had just given their life to attempt to save yours.

actually realize the sea state. There were swells from 10 to 18 feet all around! It was like one big roller coaster ride in that life raft.

I tried, to no avail, to contact Sluggo on my survival radio. We must have landed within 100 yards of each other, but evidently, there was a line-of-sight problem due to the waves. While I was sitting there I got my signalling devices out; mirror, smokes, pencil flares, etc., so that I would be ready when the SAR effort showed up.

Within an hour I sighted an Air Force C-130! I immediately shot off a pencil flare and contacted them on my radio. They saw the flare and turned to overfly my position. I was *extremely* relieved when they told me that they had me in sight. I asked about Sluggo, and they said he was in his raft less than a quarter-mile away with an injured right arm. Within an hour or two, two Air Force para rescuemen (PJs) jumped from the C-130 to assist Sluggo, whose arm was really causing him a lot of pain. I still couldn't talk to him directly, so we used the C-130 as a relay.

About this time I got seasick and started to vomit. I continued to do so every 30 to 45 minutes for the next 16 hours. I had also discovered that my neck was extremely stiff. It seemed to be only the muscles, though. After at least an hour after they had jumped in, one of the PJs came up on the radio. He had climbed into his seven-man life raft and was seasick already.

The C-130 could see the other jumper lying in the water, face up. He never moved. No one knows what happened to him, he was lost that night. It was very disheartening to realize that someone had just given his life to attempt to save yours. His name was SSGT Jeffrey Jones, and he later posthumously received the Cheney Award for valor.

About two hours before sunset, the C-130 dropped me a seven-man life raft with bundles attached (an MA-1 kit). Luckily, it landed within 50 yards of me and I could paddle over to it. I climbed out of my one-man, once again with thoughts of "JAWS," I had to deflate the waist lobes on my LPA, and climbed in. I also pulled in one of the attached bundles. All this exertion really got the old head spinning, and I spent the next few minutes throwing up. The attitude I eventually took about being seasick was "Well, as long as you're pukin', you're still breathin'!"

I opened the bundle before it got dark, got out all the signalling devices and piled them between my legs. It was going to look like the 4th of July when rescuers finally did show up! I also pulled out a couple of wool blankets to wrap up in. These were great for about three hours, but the waves kept splashing into the raft. Eventually, there was close to a foot of water in the raft and the blankets were soaked.

As the sun went down, we got word that a surface vessel would be on the scene at approximately 0330. Meanwhile, the aircraft started relieving each other. After the Air Force was a Coast Guard C-130, then a Navy P-3 and then another P-3. They each stayed on station from four to five hours. I can't say enough about the job they did. They would fly over each of our positions about every half hour and we would give them a call on our radios. Being able to talk to someone was a real morale booster. I tried to crack jokes with them (What's for supper? What time does the movie start? etc.) to just try and let them know that I was certain everything was going to turn out all right, because I knew that they felt pretty helpless. I found out later that by doing this I was helping their morale, too. This was another lesson learned — keep a good sense of humor; you've got to make the best of an impossible situation.

As dawn was breaking (what happened to 0330?) the next morning, I saw the lights of a surface vessel. It appeared to be a freighter. I later found out it was the *Lurline*. Judging from its position, it was attempting to rescue Sluggo. After close to an hour, I turned around to see another freighter about half a mile from me. I shot off almost all of my signalling devices, and they eventually pulled alongside and threw a rope over the side. I had no idea who they were and I didn't care! I tied the rope they threw me to my torso D-ring clip and they pulled me up. I had been in the water over 18 hours. It was a Japanese freighter, the *M.V. Pacific Maru*! The first thing I did was kiss the deck and tell them, "Take me to your leader!"

They stripped me down, threw me under a shower, into a hot bath, and then gave me some clothes, some soup and a glass of Johnny Walker Black Label on the rocks! I then went up on the bridge and watched as we picked up SSGT Steve Rodman, the other Air Force PJ.

Due to the high sea state, a transfer of Rodman and myself to the U.S. freighter was not possible. So we got to spend 10 days on board the Japanese freighter as it sailed for Panama. Their hospitality was outstanding. We each had our own stateroom and free roam of the ship. The ship was only two years old and had the most modern equipment. The food was great. At night we got to know each other in the ship's lounge and during the day we spent time on the deck sunning, driving golf balls, and playing baseball. It was probably the best cruise I'll ever have!

Lessons learned:

- When it's time to leave a crippled aircraft, do it!
- Stay calm and draw from your training. Those PRs do a fantastic job, but we have to use the equipment properly.
- If a "deal" seems too good to be true, it probably is!
- Use that sense of humor that we pilots seem to all have. It could save your life.

Lt. Richardson is the NATOPS officer and TA-4 NATOPS model manager with VT 21, a training squadron based at NAS Kingsville, Tex.

"Roger, Not in Sight, Continue"

By Lt. Gary J. Pabst

Mission: Night FCLP period at NAS Outlying Field
Players: CAT I RAG Pilot, CAT II RAG RIO and RAG LSO
WX: CAVU

Brief, preflight, man-up and launch in our trusty F-4 were normal, but on departure we lost our TACAN. No problem, I had flown this departure many times before and NAS Outlying Field was only 12 miles south. We cancelled with departure and switched to paddles frequency. Let the game begin:

RIO: "Can you see where the field is?"

Pilot: "No, but it's time we started our arc. The field is around 3 o'clock and we should pick it up as we pass through west."

RIO: "OK"

So we arced. Turned through west. No field. If we hadn't been first off, I'm sure we would have found the pattern — no problem. As it was, there were a lot of lights out there and we were getting confused. I started to get that prickly feeling.

RIO: "You know I think we need to come South a little more. Let's come port."

Pilot: "Roger"

We turned south. Then east. Did a 360, then south again. Basically we trundled through the night, hoping to get lucky. By this time two Phantoms had already checked into the pattern. We should see them, I thought. Suddenly:

RIO: "There is the field, 10 o'clock"

Pilot: "You're right. I'll arc to the initial."

Ah, that warm fuzzy feeling. We descended to initial altitude. A short time later:

RIO (on UHF): "Paddles, 204 at the initial."

Paddles: "Roger, not in sight, continue. Two in the pattern."

RIO: "Do you see any other planes?"

Pilot: "No, I sure don't, I'll keep my eyes peeled."

RIO (on UHF): "Paddles, 204 at the numbers for the break."

Paddles: "Roger, not in sight, continue. Check your lights, 204. Your interval is approaching the abeam."

Pilot: "I've got my lights on. He should see us."

RIO: "I know. See any planes yet?"

Pilot: "No"

That prickly feeling was returning. We heard one Phantom call the ball. Our interval should be past the abeam by now.

Pilot: "We're past midfield, I'm going to break. Keep your eyes out."

RIO: "Roger"

We broke, dirtied up and slowed to on-speed.

RIO (on UHF): "204 abeam with the gear."

Paddles: "Roger, not in sight, continue."

Now I was eyeballs in the cockpit. Fly those instruments. Get a good start. We came around the corner and just as advertised there was a centered ball.

Pilot: "I got a ball."

RIO (on UHF): "204 Phantom ball, 6.0."

Paddles: "204, you're not in sight. You sure you got your lights on?"

RIO: "That's affirmative."

Paddles: "Well we don't have you."

I was definitely not liking this and my subconscious warning bells were now really ringing. By this time we were in the middle to in-close.

Pilot: "Let's get out of here, something's wrong!"

That was the only above average decision I made all night. We climbed, cleaned up and guess what? We got a cut on our TACAN. No kidding. NAS Outlying Field was 15 miles to the north. (And we eventually did find it.) No need to tell you how we subsequently almost had two midairs or how we almost landed in the LSO shack on our first pass. It was my turn in the box, right?

You've probably figured out that we almost landed at a civilian field. It was asphalt and would not have supported 38,000 pounds of F-4. We would have made the "touch," but I'm not too sure about the "and go!" It wouldn't have been pretty!

What about the ball call I made? This field didn't have a fresnel lens, but it did have a "poor man's optical landing aid (POMOLA)." Two plywood boards raised off the ground, positioned kind of like the datums of a fresnel lens. Behind these "datums" a third board, the "Ball" is situated lower to the ground. All the boards are lit up. Get the picture? The three boards will give glide path information in a cheap but accurate way.

I leave you to ponder how we dug this hole and how we mistook that cut-rate vasi for a fresnel lens. It was a close call that almost made us really famous. Since that night I've enjoyed my obscurity. And I work at it . . . all the time. ◄

Lt. Gary Pabst completed his first cruise in the F-4 with VF 21. He then transitioned with the squadron to the F-14 and recently returned from a Western Pacific/Indian Ocean deployment in USS *Constellation*. Pabst recently reported to VF 126 at NAS Miramar, Calif.

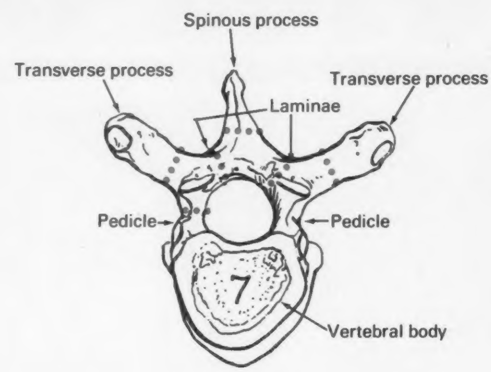
The Day the Engine Stood Still

By Lcdr. R.E. Noziglia

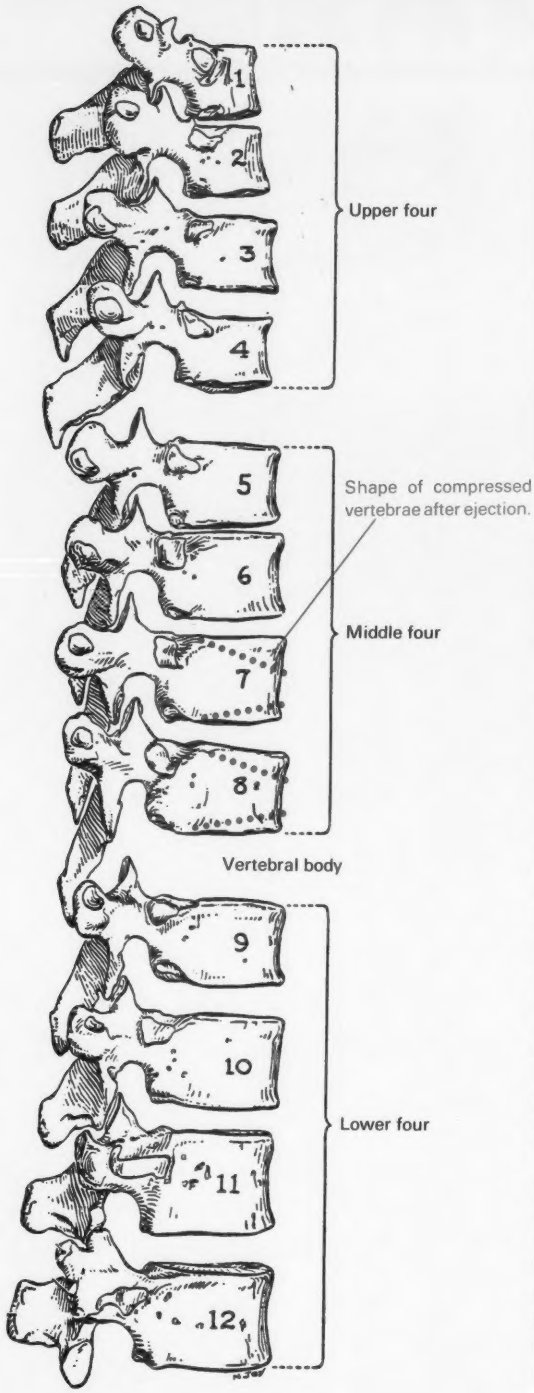
AS I contemplate the ceiling of my hospital room, flat in bed with a broken back, I'm trying to convince myself that I'm **lucky**! Another minute and a half and I would have been on deck; however, my engine came unglued in the landing pattern and I made it out right on the edge of the envelope. It also seems that getting out low and slow can turn out to be pretty hazardous to your health. Why am I lucky then? The lead sled that was one minute a slick, lean A-7E was 15 seconds later a smoldering mass of metal laying in a cotton field. Doesn't sound very lucky, but I'm alive to tell about it, should have no complications and should be back in the saddle in six to nine months. But how could I have gotten through this mess without a busted back?

My day started out as a beautiful California morning, just perfect for flying. The nearest cloud was forecast to be in Texas and I couldn't wait to do some aviating. With a cruise-hardened veteran as my wingman, we conducted a comprehensive brief, covering emergency situations and real world tactical threat scenarios. The flight included a low level awareness training segment through the high desert country of the Sierras, and into the Nevada target complex for a variety of weapons release maneuvers. Time was getting short, so instead of air combat maneuvering I took the section home to get the aircraft turned around for the next event.

The trip back to home plate was at intermediate altitude and afforded me the opportunity to troubleshoot electronic systems and related components. The penetration into home field was as smooth as silk with a flight breakup into the carrier landing pattern approved. I flew to midfield, broke level and waited for 220 knots. I lowered the gear and flaps, descended to 600 feet AGL and started to add a little power. As I moved the throttle forward I heard an uncomfortable, grinding, metal-on-metal sound from the engine, closely followed by the "ENG HOT" light coming on, and a lack of engine response to throttle movement. My first reaction was to lean forward to switch to manual fuel control; I was keenly aware of the lack of thrust and response from my power plant. I pressed the air ignite button but the next thing my scan



Thoracic Vertebrae, from above

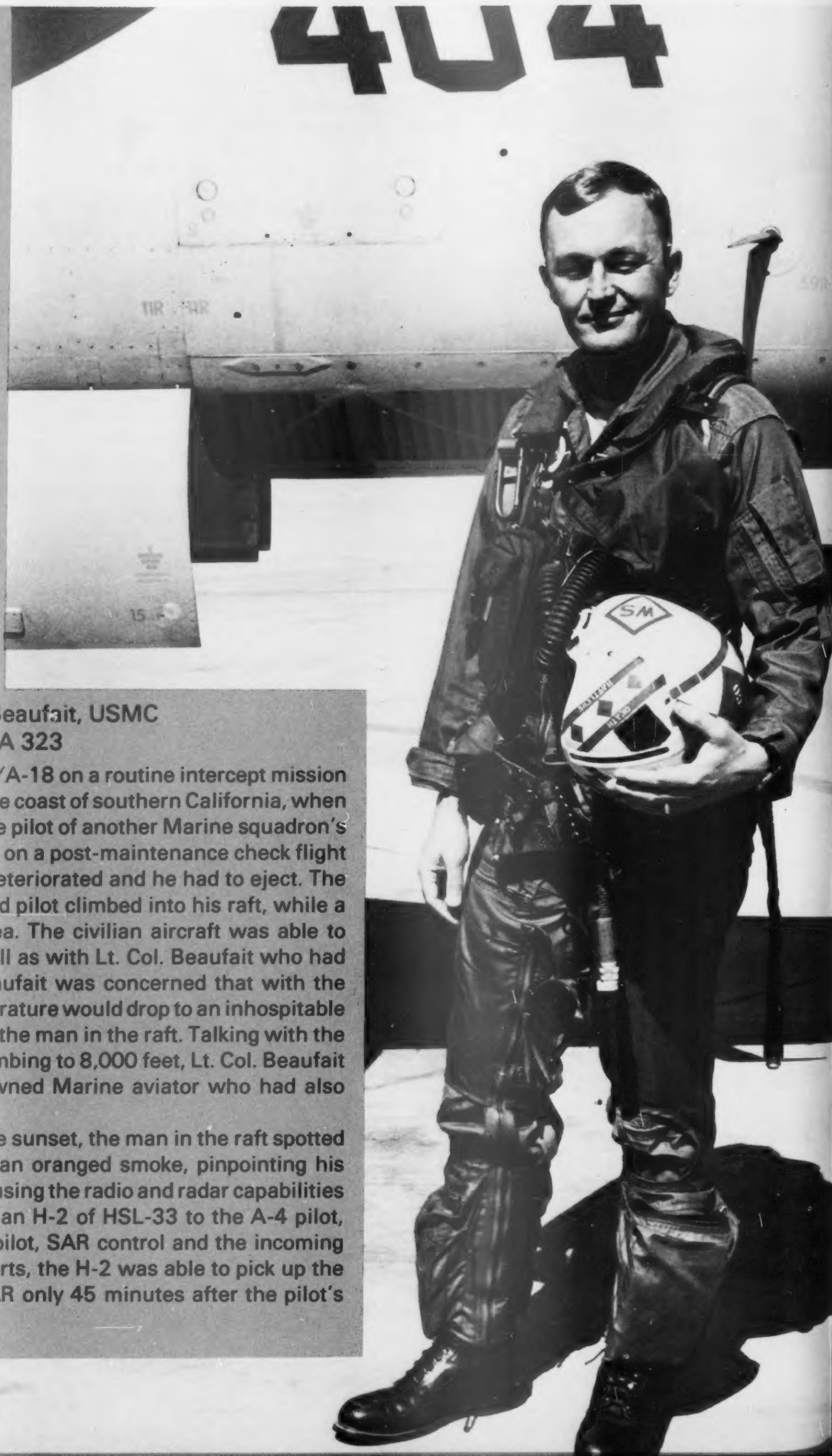


Thoracic Vertebrae, side view

picked up was 120 knots of airspeed (my planned landing speed was 137 knots) and OFF flags on every instrument. Everything was quiet, I was coming down like a lead safe and my decision was easy. "I'm outta here!" — Body position — Body position.

I made it out, got about a swing and a half in the chute, and then smacked the ground. As soon as I stood up, I knew my back was broken, so I was not about to lie down on the uneven ground in the cotton field. Some farmers got to me right away and found a board for me to lie down on. Then I was off into the Navy system and the best medical care the military has to offer. I'm now in a body cast with a good prognosis; however, the recovery will include the next month and a half flat on my back looking at ceilings. As we say in Light Attack, "It could have been worse, it could have been raining." Lets talk about the injuries; I'm convinced that an understanding of the damages inflicted on my body could save you a similar occurrence. The injuries sustained were anterior compression fractures of the seventh and eighth thoracic vertebrae as well as fractures of several of the posterior components of the same vertebrae. This injury was received during the ejection sequence. Aircraft deceleration coupled with manipulating switches on the console caused my body to be positioned leaning forward. When the rocket motor fired, my spine was compressed with the stress point focusing on the center of my back. Basically the vertebrae were compressed together at the stress point as if they were two dry sponges being pushed together. The lower ejection seat handle in the ESCAPAC seat is recessed below the level of the seat pan and can also cause a pilot to bend forward to grasp the handle. My advice to you is think through an immediate action ejection one more time: Body position — "I'm outta here" — Body position. You just never know on what day or at what time you may have to "get lucky." ➤

Lcdr. Noziglia is the maintenance officer for VA 97. He previously served with VA 192 and as a flight instructor in VT 25.



Lt. Col. D.A. Beaufait, USMC
VMFA 323

Lt. Col. Beaufait was flying his F/A-18 on a routine intercept mission west of San Clemente Island, off the coast of southern California, when he heard a "May Day" call from the pilot of another Marine squadron's A-4. The Skyhawk driver had been on a post-maintenance check flight which had suddenly and rapidly deteriorated and he had to eject. The ejection went well and the downed pilot climbed into his raft, while a civilian turbo-prop orbited the area. The civilian aircraft was able to communicate with the pilot as well as with Lt. Col. Beaufait who had arrived on the scene. Lt. Col. Beaufait was concerned that with the approach of night, the water temperature would drop to an inhospitable 57 degrees, severely endangering the man in the raft. Talking with the crew of the civilian aircraft and climbing to 8,000 feet, Lt. Col. Beaufait was finally able to locate the downed Marine aviator who had also deployed his green dye marker.

With less than 40 minutes before sunset, the man in the raft spotted the Hornet overhead and popped an oranged smoke, pinpointing his position for Lt. Col. Beaufait, who, using the radio and radar capabilities of his aircraft, was able to vector an H-2 of HSL-33 to the A-4 pilot, communication with the downed pilot, SAR control and the incoming H-2. Through Lt. Col. Beaufait efforts, the H-2 was able to pick up the mishap pilot and complete the SAR only 45 minutes after the pilot's ejection.

BRAVO ZULU

Maj. E.R. Langston, USMC
HMH 463

Major Ed Langston was the pilot-in-command of a UH-1N on what was scheduled as a routine logistics flight from MCAS, Oahu, to AAF, Hawaii. Cruising at 1,500 feet and a mile and a half from shore, the mission was suddenly interrupted by a loud bang. Immediately the aircraft experienced an extreme yaw, coupled with a severe nose tuck. Instinctively, Maj. Langston regained control of the aircraft and reacted to his first thought, "tail rotor failure." Visual confirmation by the crew revealed that the tail rotor and 90° gearbox had departed the aircraft. Relying on his experience and aeronautical abilities, Maj. Langston immediately initiated the proper emergency procedures to correct the situation, while at the same time ensuring that the other crew members were prepared for water entry and subsequent egress after landing. In the execution of an autorotation, Maj. Langston turned toward shore and controlled the aircraft to a safe water landing in an essentially level attitude. Upon landing, the aircraft rolled left and experienced sudden stoppage of the main rotor system. Maj. Langston at this time ensured that all the crew had egressed safely and proceeded to wade ashore unharmed. Maj. Langston's cool-headed response and superb airmanship not only saved a valuable material asset, but was equally responsible for limiting what could have been serious injuries or fatalities to only minor superficial injuries.

Why Do We Keep Letting Ourselves Get Set Up?

By Lcdr. Rick Horstmann

It's a rare det that doesn't experience some tense moments or a bad scare during log helo ops. This doesn't have to be; there is a better way.

RUNNING low on fuel, not sure of the direction or distance to the nearest gas stop or safe landing, an empty expanse of ocean in every direction . . . SOUND FAMILIAR? WHY?!

This problem has been cited far too many times over the years. In this publication, for example, "Vectors to Flameout," November 1982. A recent series of messages within the H-46 community discussing the near loss of an H-46 due to fuel starvation called for extended fuel capacity and better navigation aids. Over the years, stricter and stricter squadron standard operating procedures have been developed for ship to ship operations within the H-46 community. These procedures, if strictly adhered to, should prevent an aircraft from ever getting into a fuel-related extremis situation during log helo operations. In spite of this, every single "lessons learned" I have seen talks about identical problems with log helo operations. This tells me we are still having uncomfortable moments and close calls.

Since we have known of the potential problems involved in helo log runs and have developed procedures that would eliminate these problems, why do we keep getting ourselves in uncomfortable situations? I think there are two reasons. Lack of planning is one. The other is a "CAN DO" attitude and the desire to get the job done. Both cause us to stretch the rules.

Problem number one occurs as a direct result of a lack of planning. H-46 detachments are inherently flexible and can accommodate logistic schedule changes with relative ease, but planning for the daily logistics helo should not be a case of the "tail wagging the dog." Planning **is** needed for safety and better service.

I have just returned from an extended H-46 deployment in the Indian Ocean where I operated with three battle groups. Planning for most logistic operations was generally excellent. Each battle group published a schedule of events weeks in advance and normally a detailed message listing times, stations, order for coming alongside, rigs to be used and items to be transferred. The one exception to the good logistics planning was the logistics helo planning. One battle group routinely sent the log helo message after midnight, often listing a first light overhead. Then, upon arrival at the carrier, we could count on receiving material for more ships than those listed on the message.

Another battle group scheduled the log helo to land right after the daily COD flight. Everything on the COD was unloaded directly onto the log helo. It seemed like little, if any, consideration was given to force disposition. The usual next step in this sequence was for each ship in the battle group to start calling the helo asking if the helo had anything for them, if so exactly what and when would they be overhead? These questions are hard to answer when you are often not even sure what has been piled on board your helo. These queries usually receive that often heard radio call, "Roger Standby," at which the ships respond patiently with respectful silence for some 10 to 15 seconds before asking again. Now, with so much chatter on the radio you struggle to hear the ICS and your crew frantically sorts the cargo. This is where the **real** log helo planning takes place. Add to this an aggressive "Can Do" attitude, often unreliable position reports, and the real wonder is that we don't get ourselves in trouble more often.

Faced with such a situation, we generally found it best to return to home plate, sort the cargo, top off and figure out the most logical way to make the deliveries.

One battle group, however, did it right. The carrier kept tight control and every day the following log helo message came out, listing the flights for the following day:

From: Carrier
To: Delivery Ship
Info: Battle Group
Subj: Helo Logistics Schedule

1. Log helo limited in range/fuel. Must have reasonable accurate position of participating units. To be retained in log helo schedule below, participating units must provide carrier and delivery ship latest position one hour prior to launch.
2. Request delivery ship provide H-46 for following schedule:

OVH	*SHIP*	*PICKUP*	*DROP*
	Customer	Maint Pers	
0900	Carrier	Mail	Mail
		NDI Inspectors	Maint Pers
	Customer		NDI Inspectors
			Mail

3. If restrictive EMCON in effect:
   a. Log helo contact carrier CNTRL on button freq for vectors.
   b. All units sked for svcs provide flight following and vectors to next stop.
   c. Green deck status lights and closed-up hotel flag will mean cleared to land/vertrep/hoist (as applicable).
4. Fuel consumption and force disposition considered; HAC may alter schedule to accomplish the above transfer. Request HAC pass by means available, arrivals and ETA to next destination for flight following.
5. Except at carrier, transfers to be completed on vertrep common (freq). Initial contact carrier on marshal (freq), expect transfer to land/launch freq for landing.
6. Mail: FFT ashore, to be accepted at all stops and delivered to carrier.
7. For delivery ship req advise portions para 2 comp/incomp in log helo summary.

The delivery ship would then simply fill in the overhead times for the receiving ships.

The use of such a method allows for safer operations and better service.

Safer operations, because the mission can be planned prior to takeoff, not in the cockpit, while flying in an already demanding environment. Seems I remember something from flight school about planning your mission prior to takeoff. Safer also because it requires each ship to be within range if they want to be retained on the schedule. Above all, this technique gets all ships involved in the safe conduct of the flight.

Better service is provided because each ship knows when the log helo is due and can plan for it. Standing by for extended periods is frustrating, disruptive and a poor use of assets. Everyone starts with the same game plan and gets involved in the safe completion of the evolution.

When last minute taskings do arise, some common sense and good judgment are necessary. The question should be asked: are the missions really necessary or could they be done using the next day's log helo? We have developed what I consider to be a 7-11 mentality toward our helos. Ever announce in a group that you are going to make a run to the convenience store? Immediately, everyone asks himself, "what can he get me?," often asking for things they don't really need right away. Example: at the completion of an evolution one ship called our helo and asked us to make a delivery. They coordinated the mission with home plate and went to flight quarters. The ship we were to make the delivery to went to flight quarters. We flew an extra two hours including refueling and transit time. The ships were about 30 miles apart. The cargo: half a seabag of clean dungarees and a change of skivvies. WORTH IT? Unless the task is really urgent, most ships would consider it better service to receive the log helo the following day on a scheduled flight.

Reason number two for getting into trouble is our own tendency to stretch the rules to get the job done. This will always be a matter ruled by the good judgment of the HAC and no small amount of fortitude on the part of the OINC.

However, we can help ourselves here by including the log helo and over-the-horizon operation requirements in NATOPS and NWP-42 in the same manner as night VERTREP requirements have been incorporated. This way we are all playing by the same rules, and the "If he can, why can't you?" factor is eliminated.

Good planning and standarization will improve safety. It will also reduce unnecessary flight hours in an environment where the number of hours being flown is a concern. It's time these basics become standard routine rather than the exception.

Lcdr. Horstmann graduated from the U.S. Naval Academy in 1972, and has served with HC-16, HC-11 and HC-5 as an H-46 pilot.

We were the ones who were going to change NATOPS.
And then it dawned upon me that we were . . .

THEM

By Lt. J.J. Mallia

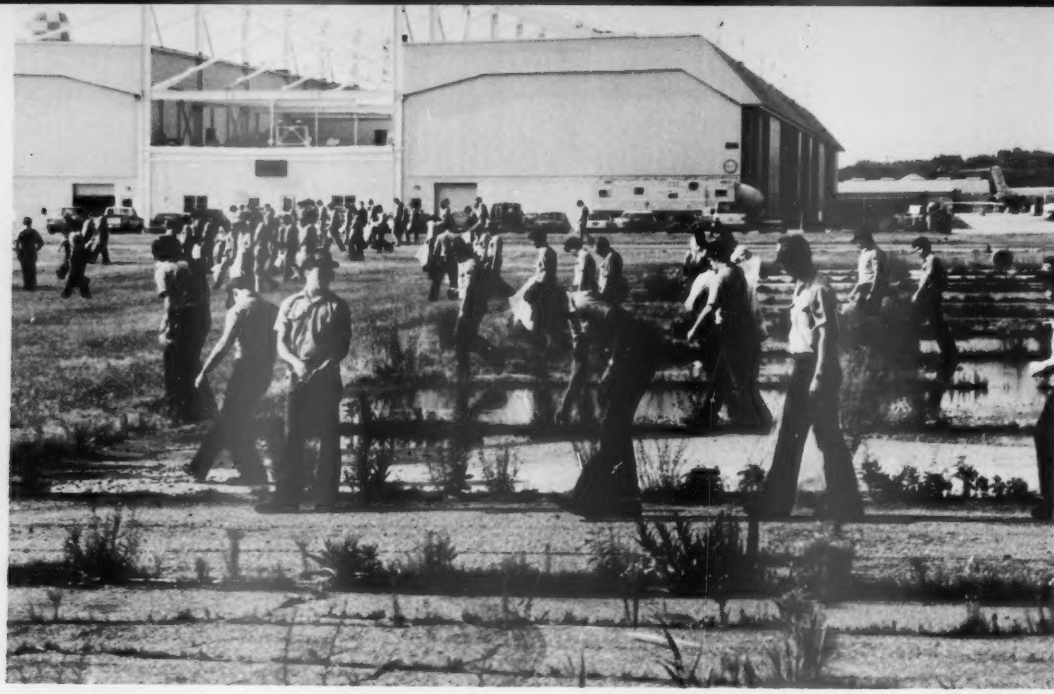
I have heard it said that when you understand who "They" are, and can comprehend "the big picture," you will probably be selected for admiral. Recently, I attended a NATOPS conference and had the opportunity to discover who some of "them" are. Unfortunately, I am still working on the big picture.

Since my first days in naval aviation, I have punctiliously studied emergency procedures. I acknowledged those procedures as infallible, because whoever had written them must have had "the big picture." I envisioned a group of safety engineers, all with multiple PhDs, who labored feverishly in labs owned by COMNAVAIRSYSCOM or COMNAVAIRPAC or COMNAVSIXPAC, and whose only function was to design procedures covering every possible contingency. If I followed their procedures, I knew that I would always bring my distressed aircraft to a safe and happy landing. I believed in "them."

A scant six years later, I sat at a NATOPS conference surrounded by 10 of my contemporaries. On the table in front of me were 52 NATOPS change recommendations. We were intent on **actually changing procedures!** It was incredible! I waited anxiously for the safety engineers to burst through the door with calculators and slide rules ablaze, but they never came. And then it dawned upon me that *we* were "them." *We* were the ones who were going to change NATOPS. And in retrospect, who else should do it? *We were the users of the aircraft. It was our* business.

So what's the point? That we need not follow NATOPS procedures because the safety engineers are gone? Of course not. The procedures are basically sound and, in most cases, time tested. However, it might not be a bad idea to question procedures *you* don't feel are effective. If *you* feel changes need to be made, do *your* homework, and submit a change. *You* are qualified and it's your business. (And just consider, you'll be one step closer to admiral.)

Lt. Mallia flew A-7Es in the fleet and is currently an intermediate phase instructor flying the T-2C Buckeye, in addition to being an LSO. He wrote this article after attending a recent NATOPS review conference.



All-Hands Walkdown

By Lcdr. Scott Thomas

SAFETY departments are often hard pressed to come up with a creative, positive idea that involves all hands, making them want to buy a piece of the responsibility. NAS Norfolk has successfully used an "All-Hands Airfield FOD Walkdown" for just this purpose for two years in a row. To many people, calling a FOD walkdown generates as much grumbling and heel dragging as the requirements for flu shots. But both are preventive measures. The major difference at Norfolk is that the airfield-wide walkdown is supported by the tenant activities as well as the air station.

Many squadrons literally applied all hands. There were lots of khaki in the line, including two wing commanders, numerous COs and XOs, more junior officers and department heads than chiefs, and about as many chiefs out on the field as I saw at the last CPO initiation. The tenants have supported this all-hands walkdown from the start and are all eager to out participate each other. The friendly competition has been beneficial and contagious.

NAS Norfolk held its second annual "All-Hands FOD Walkdown" on July 3, 1985. It included **in excess of 1,600 people** from 35 different departments, squadrons and detachments. Shuttle buses started running at 0730 so that the teams were assembled and ready to go at 0800, which is when the field had been NOTAM'd to close. The aircraft operating area was divided into seven segments, with a proportionate number of people assigned to each. Additionally, all activities were encouraged to sweep their own immediate areas. The airfield was closed from 0800 to 1100, so that those on the runways and taxiways could concentrate on picking up FOD, rather than worry about jet blast or aircraft on final. The

tower also liked this far better than mixing people, trucks and aircraft.

Overall coordination was accomplished via walkie talkies to the NAS officer (call sign "Fodfather"), his two assistants and each of the seven area coordinators. One of the assistants stayed near the dumpster provided for the walkdown to supervise the unloading of the FOD pickup trucks that had been assigned to each area. He had access to a telephone to call for any additional materials that might be needed. An ambulance was positioned at that central point so all the coordinators knew where the corpsmen were, had they been needed.

The other assistant served as a roving troubleshooter, carrying several extra boxes of trash bags to replace the full/heavy bags that were sent to the dumpster. During last year's walkdown, this roving truck wound up with a railroad tie, pieces of mowing machines, marsten matting, crossdeck pendants and chain, to name a few of the unexpected pieces of FOD that were "hidden" in plain view.

A station-wide all-hands FOD walkdown is a big undertaking but it is not hard to do if the planning starts well before the event. One month is definitely not enough time, two is comfortable. The key to success is the same as in anything else — plan, plan, plan.

- Who will participate?
- How many people are needed?
- How many people will participate?
- Which areas are to be walked?
- Transportation from the working spaces to the area to be walked and back again when complete.
- Trash bags for each person who will participate.
- Transportation for the trash from the walkdown line to the centralized collection point (dedicated dumpster).
- Adequate communications from each area coordinator to the overall coordinator.
- Dedicated time block for the walkdown (very important not to conflict with any other activity; maintenance, flying, etc).
- Medical assistance available.

A walkdown of this magnitude has been extremely successful and well supported as an annual event. Remember to keep the common goals, reduction of FOD incidents and a clean place to work, foremost. Above all, involve the players from the beginning, plan in extreme detail and let the participants see the immediate results. The central dumpster has worked well for us in that regard.

Now that the corporate memory of the previous FOD walkdowns has been transferred to the entire aviation safety department, NAS Norfolk can look forward to not only reducing the number of FOD-related incidents but a clean air station. Professionals like to work where it's clean. ◄

Lcdr. Thomas is the aviation safety officer for NAS Norfolk. He served two tours as an E-2 pilot with VAW 126, where he was also the ASO.

1985 Index

Carrier Operations

Flight Gear and Survival

Facilities and Ground Operations

Flight Operations

FOD

Instrument Flying and Navigation

Maintenance

Midairs and Near Midairs

Miscellaneous

Safety Programs and Philosophy

Training

Weather/All Weather Operations

Re: Engine-out Flying Technique (Aug '85)

FPO, San Francisco, Calif. — I am a sophomoric "shoe" with eclectic reading habits. Request confirmation that your flight deck ops photo on page 18 is a montage. Also, your "Sierra Hotel to Delta Sierra" article on page 8 was Bravo Zulu.

Lcdr. J. Brown
First Lieutenant, LSD 39

• Would we lead you down the primrose path or resort to photographic trickery? Absolutely not . . . well, maybe . . . but in this case, the photograph shows the real thing. During the early 1960s there was interest in adapting certain fixed-wing aircraft for carrier operations. The British P.1127 — progenitor of today's Harrier and AV-8 — seemed a natural.

United States' efforts included the LTV XC-142A, a four-engine, tilt-wing V/STOL aircraft to be used as a tactical transport, and the Lockheed KC-130F Hercules. Beginning on October 30, 1963, and continuing through mid-November a KC-130F piloted by then Lt. James H. Flatley III (now-Rear Admiral) made several approaches and landings aboard the USS *Forrestal* (CV 59) using no arresting gear. RAdm. Flatley also made a number of launches at weights of 100,000 to 120,000 pounds.

Although no firm program of design came from these tests, the program did prove the feasibility of operating large troop/cargo fixed-wing transports from carriers, if needed. — Ed.

San Diego, Calif. — Hooray for Lt. Bobbitt's article on engine-out flying technique. Personally, I was beginning to wonder if the procedures the author mentioned would ever be recognized by the Navy. The article is comprehensive, but I find two points that require clarification.

Bobbitt's definition of critical engine as "the engine that, if failed, would adversely affect heading control" leads one to assume that all engines are critical. Actually, the critical engine is the engine, the failure of which, would most adversely affect aircraft control. The loss of power or thrust from the critical engine has the most detrimental effect on control of all engines available, impacting heading control and Vmc to the greatest degree. Moreover, performance may suffer due to loss of such subsystems as anti-skid braking, speedbrakes and other hydraulically operated controls powered by the critical engine on jet aircraft which do not have assymetric disc loadings to contend with.

Secondly, Bobbitt refers to the five-degree wing-down method: "As in any forward slip, reduced wing span perpendicular to the weight vector requires an increase in wing lift to stay airborne." Although his analysis of increased wing loading and induced drag is correct, his comparison with a forward slip is inaccurate. It is vitally important to emphasize that the five-degree bank into the operative engine, with the balance ball deflected toward the same, results in coordinated, zero-sideslip, minimum total drag flight. Observation of the yaw string in the demonstration that Bobbitt later outlines will reveal this fact.

All in all, I am very pleased to see this subject in Approach and I encourage you to publish more like it in the future.

Ltjg. "Pops" Wheeler
VS-33 Screwbirds
NAS North Island

Re: "If the Navy Wanted You to Have One, the Navy Would Have Issued You One. . ." (Sept '85)

Moffett Field, Calif. — Lcdr. Peck's comprehensive and valuable article in the always excellent Approach dealing with aviation information sources omitted mention of the material available (at no charge) from NASA's Aviation Safety Reporting System Office — although he did note the FAA Advisory Circular describing the ASRS.

In addition to the incident reports from air carrier and general aviation pilots, and air traffic controllers, we also receive reports from your Safety Center and from USAF. A good many squadron safety officers and pilots submit reports directly to us, in addition to their official ones, and we have a substantial group of naval aviators on our mailing list. As a former (WW II combat and active reserve) Navy pilot — this naturally brings me pleasure and I use Navy reports in our monthly bulletin, CALLBACK, whenever I see one that fits.

Approach is circulated among our staff members — all of whom are retired professional pilots or air traffic controllers — and read with interest.

Capt. Rex Hardy (USNR-Ret.)
Editor, CALLBACK
NASA Aviation Safety
Reporting System

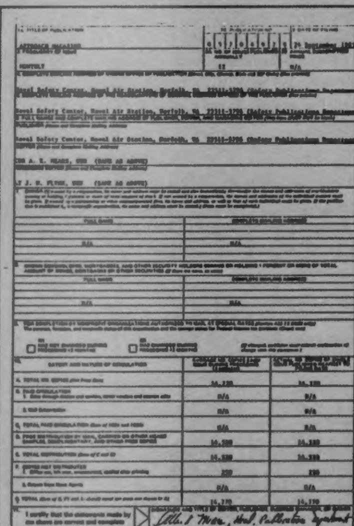
• For a copy of CALLBACK's research paper listing or to inquire about getting on CALLBACK's mailing list, contact them at NASA, Ames Research Center, Moffet Field, CA 94035 — Ed.

Re: Bravo Zulu (Oct '85)

East Marion, N.Y. — This concerns your October issue of Approach, specifically the article about John and Todd Duell. Many thanks for one of the more accurate reports written on that incident (the plane used was a Cessna 182, not a 172).

As a former Air Force family (John flew in Viet Nam and now is an airline pilot), we appreciate the detailed account of this incident and the recognition you have given the Duells.

Mrs. John V. Duell



Approach welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: Approach Editor, Naval Safety Center, NAS Norfolk, VA 23511-5796. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

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FLIGHT SAFETY IS AN

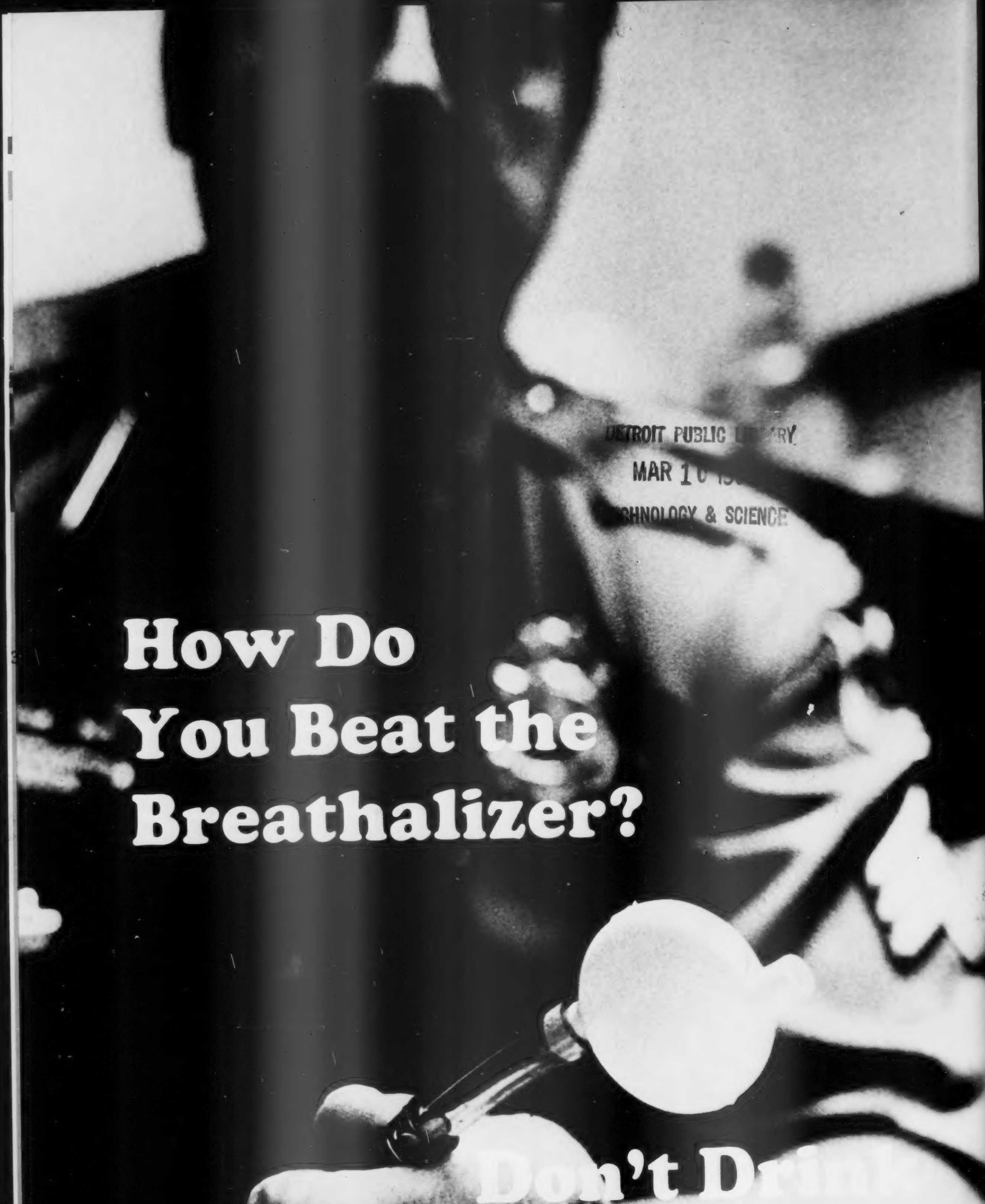
A * R * T

WARENESS

ESPONSIBILITY

HOUGHT

Poster idea contributed by AD2 Neil S. Kapp, HS1197-HS1, NAS Jax.


How Do
You Beat the
Breathalizer?
Don't Drin